

The Connection between Small gamma-ray Flares and SEPs with COMPTEL/CGRO

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While it is clear that particle acceleration is occurring during flares, what is less clear is the connection between the neutral radiation observed concomitant with the flare and the in-situ observations of SEPs. For the largest SEP events, where current instruments possess the sensitivity to observe nuclear-related gamma-ray emission, the origin of SEPs is generally divided between an escaping accelerated flare population and a population of coronal particles (or some admixture) accelerated through CME-driven shocks. Small flares, as defined by their X-ray emission, have been found to correlate with the presence of small "impulsive" (enriched in electrons and heavy nuclei) SEP events, suggesting that small SEP events are originally flare particles. The difficulty with this interpretation is that small flares lack detectable nuclear-related gamma-ray emission. Whether this emission is there or not is unclear because current instruments capable of high-energy gamma-ray observations operate above the sensitivity threshold for observing gamma-ray emission from small flares (< C-class). The COMPton TELescope (COMPTEL) aboard the Compton Gamma Ray Observatory (CGRO) provided unprecedented, and as yet unsurpassed, sensitivity to γ rays in the 0.7 to 30 MeV energy range and neutrons in the 20 to 150 MeV energy range. This, combined with its nine years of operation, has produced a unique data set of observations for almost a complete solar cycle. The COMPTEL archival data offers the best possibility to investigate a connection between SEP observations in space and small-flare gamma-ray emission. We present preliminary results of a small-flare search within the COMPTEL archival data and discuss the correlation between already well-established compilations of SEP events and small impulsive or ^3He -rich SEP events. Establishing a connection and determining the characterization of this connection, would signify an important development in our understanding of how and where flare particles are accelerated and how these very same particles escape into the interplanetary medium. Equally important would be demonstrating the inconsistencies or poor correlation between gamma-ray emission and small impulsive SEP events.